Credit Securitizations, Risk Measurement and Credit Ratings

Associate Professor of Finance Harald Scheule (University of Technology, Sydney, Business School) explains the interaction between asset securitisation, business cycles and the impact on risk measures such as credit ratings. Parts of this research are supported by an Australian Centre for Financial Studies grant and the Centre for International Finance and Regulation (project number E001) which is funded by the Commonwealth and NSW Governments and supported by other Consortium members (see www.cifr.edu.au). Further results on risk measurement approaches and policy implications are included in a new Wiley book on credit securitizations and derivatives (see Roesch & Scheule, 2013).

Credit portfolio securitizations involve the sale of assets into bankruptcy-remote special purpose vehicles, which are funded by investors of different seniorities (tranches). Based on the nature of the securitized asset portfolios, important transaction types include asset-backed securities, collateralized debt obligations, home equity loan-backed securities and mortgage-backed securities.

Credit portfolio risk which underlies asset securitisations has generally a heavy tail distribution with large credit losses occurring in financial crises at relative low likelihoods. The recent Global Financial Crisis (GFC) implied such large increases in the loss rate of mortgage loan portfolios.

Figure 1 (compare Roesch & Scheule, 2013) shows that delinquency rates in the US fluctuate over time with the business cycle within a general interval of 2 to 4%. Delinquency rates are high in economic downturns and low in economic upturns. Delinquency rates demonstrate memory effects in which the delinquency rate reflects levels in prior years. Economic downturn years may be identified as 1991 (first Gulf War), 2002 (US terrorist attacks) and 2008 to 2011 (GFC). Credit card loans expose generally higher delinquency rates than other consumer loans. However, single-family residential mortgages (grey line with black markers) jumped during the GFC from 2% to 11% in 2010 and exceed the level of credit card loans!
Credit portfolio risk models measure the risk for loan portfolios. Such models are generally based on a set of parameters such as probabilities of default, loss rates given default, exposures at default and correlations. Correlations may relate to combinations of loans/borrowers or risk measures. Important examples are default and asset correlations for the earlier and PD/LGD correlations for the later.

Mortgage portfolios are retail portfolios and characterized by a large number of mortgages. The US delinquency rates, which are presented in Figure 1, relate to all loans by US commercial banks and may be used as reliable proxies for the default rate of a representative portfolio.

Credit portfolio risk is generally measured by distributions rather than single points of default rates. Financial institutions and rating agencies may generate these default rate distributions using a number of techniques (e.g., analytical approaches, Monte Carlo simulations, historical simulations) and derive key portfolio measures, such as expected loss (mean), value at risk (percentile) or expected shortfall (mean of values exceeding a percentile). Common percentiles are 99.9% (which describe the worst in 1,000 future scenarios) for regulatory considerations or higher for bank-internal considerations.
Important regulatory accounting variables such as provisions and capital are calculated from these measures by financial institutions and the profitability of capital investments (e.g., return on equity or risk adjusted returns) by investors. Rating agencies may assist in this analysis by providing risk measures which are then mapped into accounting values or performance measures.

Figure 2 (compare Roesch & Scheule, 2013) shows the default rate distribution for delinquency rates for single-family residential mortgages in the first quarter of 2006, which represents an economic boom state and 2011, which represents an economic recession state. A Basel II asset correlation for residential mortgage loans of 15% (consistent with Basel II and Basel III regulation) and the Vasicek density was assumed in deriving the distribution of portfolio loss rates. The vertical lines indicate the expected default rates of 1.6% and 10.4% for the two states.

Figure 2: Credit portfolio loss distributions

Credit derivatives and securitizations are often subject to tranching, which increases the sensitivity to systematic risk. The interaction between states of the economy and the risk exposure for tranches can be seen in Figure 2. The attachment risk increases for senior tranches more so than for junior tranches from economic booms to economic downturns.
For example, if a structure has an equity, mezzanine and junior tranche with attachment levels zero, 0%, 5% and 20%, then the attachment probability for the equity tranche is equal to 100% for large portfolios in both economic scenarios. The attachment probability mezzanine tranche is 5.18% in a boom and 74.55% in a recession. The attachment probability for the senior tranche is 0.02% in a boom and 10.53% in a recession. The ratio for the attachment probability of a recession and a boom is 1, 14.4 and 526.5 respectively.

This observation is important as credit rating agencies often follow a through the cycle rating philosophy in which average attachment probabilities are mapped into credit ratings. This approach is known as through-the-cycle rating (TTC). Credit ratings for securitisations had a low likelihood of being revised before the GFC. Ratings were systematically revised well after the beginning of this crisis. Note that some rating agencies use expected loss metric rather than attachment probabilities and that prior research has shown that similar conclusions can be drawn for this metric. TTC models will lead to time-invariant measures of risk, while the true risk (i.e., the data generating process depends) highly on the state of the economy and therefore the point-in-time (PIT). The problem is exacerbated for mezzanine and senior tranches.

These observations have a number of important implications which are discussed in Roesch & Scheule (2012) and Luetzenkirchen et al. (2013). Firstly, credit ratings should be of a PIT rather than TTC nature.

Secondly, with the change of rating standard, capital and provision requirements may become more cyclical and regulators may have to think of ways how to dampen this cyclicality. Note that regulators currently discuss anti-cyclical capital buffers in the context of Basel III which may address such model properties.

Thirdly, industry and regulators rely on assumptions on the impact of macroeconomic risk which is captured in correlations (and other assumptions) between random components such as default events and losses given default, may have to be revisited and incorporated into regulatory policies.

Finally, securitisations allow the risk transfer outside the traditional banking system and may involve a release of capital requirements which may feed back into the banking system if investors are leveraged. An expansion of regulatory policies to financial service providers outside the commercial banking system appears to be valuable.


References

